

A NEW GENUS NEAR *CANACEOIDES* CRESSON, THREE NEW
SPECIES AND NOTES ON THEIR CLASSIFICATION
(DIPTERA: CANACIDAE)

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Abstract.—A diagnosis is given of *Paracanace*, new genus, and a key is presented for the separation of the seven known species, including three new species which are described and illustrated: *hoguei*, a new species from Cocos Island, Costa Rica; *lebam*, a new species from Jamaica; and *aicen*, a new species from Dominica. A cladogram is diagrammed for the genus and gives apotypic character states for the phylogeny of the species of *Paracanace* and of its sister-group, *Canaceoides* Cresson.

Surf or beach flies were last reviewed as a family by Wirth (1951). In that publication, Wirth described *Canace maritima* as a new species from the Galapagos Islands. Five years later, Wirth (1956) described two additional species, *C. blantoni* (Panama) and *C. oliveirai* (Brazil); both are closely related to *C. maritima*. In 1969(b), Wirth described a fourth related species, *C. cavagnaroi*, which like *C. maritima* is also from the Galapagos Islands. The present paper is a continuation of this series. The species noted above plus three new ones are distinguished as a new genus, *Paracanace*. A key to the species of *Paracanace* and illustrations of the new species are provided for their identification. Illustrations of the epandrium and surstylus of the male terminalia accompanied the descriptions of each previously described species; neither the descriptions nor the illustrations are republished here.

Paracanace Mathis and Wirth, new genus

Type-species.—*Paracanace hoguei* Mathis and Wirth, new species, by present designation.

Species included.—*Paracanace aicen*, new species; *P. blantoni* (Wirth), new combination; *P. cavagnaroi* (Wirth), new combination; *P. hoguei*, new species; *P. lebam*, new species; *P. maritima* (Wirth), new combination; *P. oliveirai* (Wirth), new combination.

Diagnosis.—*Paracanace* is distinguished from other genera of the family by the following combination of characters (an asterisk indicates apotypic character states): General coloration light to dark gray; head in lateral aspect higher than wide; 3 pairs of eclinate fronto-orbital setae; *2 pairs of proclinate interfrontal setae, posterior pair aligned with, or posterior of

median ocellus; mesofrons mostly dull, pollinose; eye in lateral aspect as high as wide, with oblique orientation to general plane of body; 4 pairs of genal setae, anterior pair cruciate anteriorly, 3 posterior pairs dorsally-curved; *anterior notopleural seta reduced, inconspicuous; front femur lacking row of anteroventral, spinelike setae; *middle femur of male with posteroventral row of closely set setae, proximal ones frequently pale; *scutellum bare except for 2 pairs of lateral setae; female cerci with 2 pairs of stout apical setae.

Description.—Small to moderately small beach flies, length 1.43 to 2.57 mm; coloration mostly gray; vestiture mostly pollinose, dull in appearance.

Head: Lateral aspect higher than wide; mesofrons mostly full, pollinose, but specimens of some species with some lustrous, semimetallic reflections as viewed from some angles; mesofrons triangular, nearly equilateral, anterior angle napiform; ocelli arranged to form isosceles triangle, distance between posterior ocelli larger than between either posterior ocellus and median 1; parafrons somewhat membranous and distinguished in color and conformation from mesofrons; fronto-orbits evenly wide along dorsal and anterodorsal margin of eye, continuing ventrally as parafacies. Chaetotaxy of frons as follows: Ocellar bristles large, divergent, inserted between posterior and median ocelli; 2 pairs of proclinate interfrontal bristles, posterior pair more or less aligned with ocellar bristles; 1 pair of proclinate to divergent postocellar bristles inserted posteromedially of posterior ocelli; mesofrons with several other smaller setae, especially anterolaterally; 3 pairs of larger eclinate fronto-orbital bristles and several smaller setae; parafrons with 3–4 smaller setae; inner and outer vertical bristles well developed, inserted posteriad of posterior ocelli. Antenna dark colored, brownish black to black; 3rd segment subcircular with pubescent vestiture; arista slightly longer than combined length of first 3 segments, micropectinate on dorsal and ventral surfaces. Face silvery gray to charcoal gray, bare, broadly carinate medially, ventral margin concave. Gena nearly concolorous with face, slightly darker, about $\frac{1}{2}$ as high as eye anteriorly, becoming higher posteriorly; 4 pairs of genal bristles, anterior pair convergent anteriorly, next 3 pairs dorsally curved; postgena with several pale setae toward ventral margin. Eye in lateral aspect as high as wide, broadly oval to subrectangular, oriented at oblique angle to remainder of head. Clypeus broad, protruding through ventral facial concavity. Maxillary palpus somewhat pale, sparsely setose with fine pale setae.

Thorax: Mesonotum darker than pleural areas, dark brownish gray to charcoal gray, pleural areas uniformly gray. Chaetotaxy of thorax as follows: Acrostichal setae mostly small, hairlike except for 1 pair of larger

prescutellar bristles; 4 pairs of dorsocentral bristles, posterior pair displaced laterally; 1 pair of humeral bristles; 1 pair of presutural bristles; often with 1 or 2 pairs of moderately large posthumeral setae; 1 pair of supra-alar bristles; 1 pair of postalar bristles; scutellum bare except for 2 pairs of lateral bristles; mesonotum with several scattered smaller setae in addition to larger bristles; 2 pairs of notopleural bristles, seta at anterior angle much smaller than posterior setae, 1-2 other smaller setae; mesopleuron with 3-4 bristles and several smaller setae, larger bristles inserted on posterior $\frac{1}{2}$; 1 larger ventrally-curved lower mesopleural seta; sternopleuron with 1 larger bristle toward posterodorsal angle and several moderately larger setae anteroventrally; mesopleuron and hypopleuron bare; front and middle coxae setose, several setae pale. Legs generally concolorous with pleural areas, basitarsi of middle and hind leg frequently pale; legs setose, development of setae varying with species. Halter pale. Wing slightly infuscated to mostly hyaline; vein R_1 long; see figures for details.

Abdomen: Mostly concolorous with thoracic pleural areas; symmetrically setose bilaterally; males with 6 terga and epandrium exposed; females with 8 terga and genital cerci exposed. Surstylus of male terminalia simple, digitiform to lobelike except for *P. maritima*, in *P. maritima* with subbasal anterior setulose lobe and constriction. Eighth tergum of female with 1-2 pairs of larger setae; female genital cerci with 2 pairs of apical stout spines; female atrium oval.

Geographic distribution.—The composite distribution of the genus is Neotropical, between 19° north latitude and 23° south latitude. Five of the seven species are known only from islands in the Caribbean Sea and Pacific Ocean.

Key to Species of *Paracanace*

1. Costal vein between humeral crossvein and subcostal break with a row of long, spinelike setae, setal length equal to, or greater than width of 1st costal cell; middle femur of male with posteroventral row of closely set setae along entire length, those along proximal $\frac{1}{4}$ pale; front femur with 3-4 long setae along posteroventral margin, setal length subequal to $2 \times$ femoral width 2
- Setae along anterior margin of wing much shorter, not more than $\frac{1}{2}$ width of 1st costal cell; middle femur of male with posteroventral row of closely set setae along distal $\frac{1}{2}$ only; front femur lacking 3-4 setae as described above 4
2. Three dorsally-curved genal setae subequal in length; body strongly setose (Cocos Island, Costa Rica) *P. hoguei*, new species

- Middle dorsally-curved genal seta about $\frac{1}{2}$ length of setae on either side; body moderately setose 3
- 3. Surstylus broader on distal $\frac{1}{2}$, especially evident in lateral view; ventral surstylar margin broadly truncate in lateral and posterior views; posterior margin of surstylus bearing distinct row of longer setae (Jamaica) *P. lebam*, new species
- Surstylus in lateral view swollen along anterior margin near middle, tapering ventrally to broadly rounded ventral margin; posterior margin of surstylus lacking distinct row of longer setae; posteroventral angle of surstylus noticeably produced apically (Dominica) *P. aicen*, new species
- 4. Front and middle femora of male with row of about 20 long white setae along proximal $\frac{1}{2}$ of posteroventral margin; surstylus with subbasal anterior setose lobe and constriction before apical enlargement (Galapagos Islands) *P. maritima* (Wirth)
- Front and middle femora of male with not more than 10 long white setae along posteroventral margin at base; surstylus simple, lacking anterior setose lobe or subbasal constriction 5
- 5. Tarsi mostly dark, concolorous with tibiae (Galapagos Islands) *P. cavagnaroi* (Wirth)
- Tarsi mostly pale, yellowish, especially basitarsus of hind leg 6
- 6. Surstylus slender, angulate, length about $3\times$ width (Brazil) *P. oliveirai* (Wirth)
- Surstylus broad, truncate ventrally, length not more than $2\times$ width, posteroventral angle slightly produced (Panama) *P. blantoni* (Wirth)

Paracanace hoguei Mathis and Wirth, new species

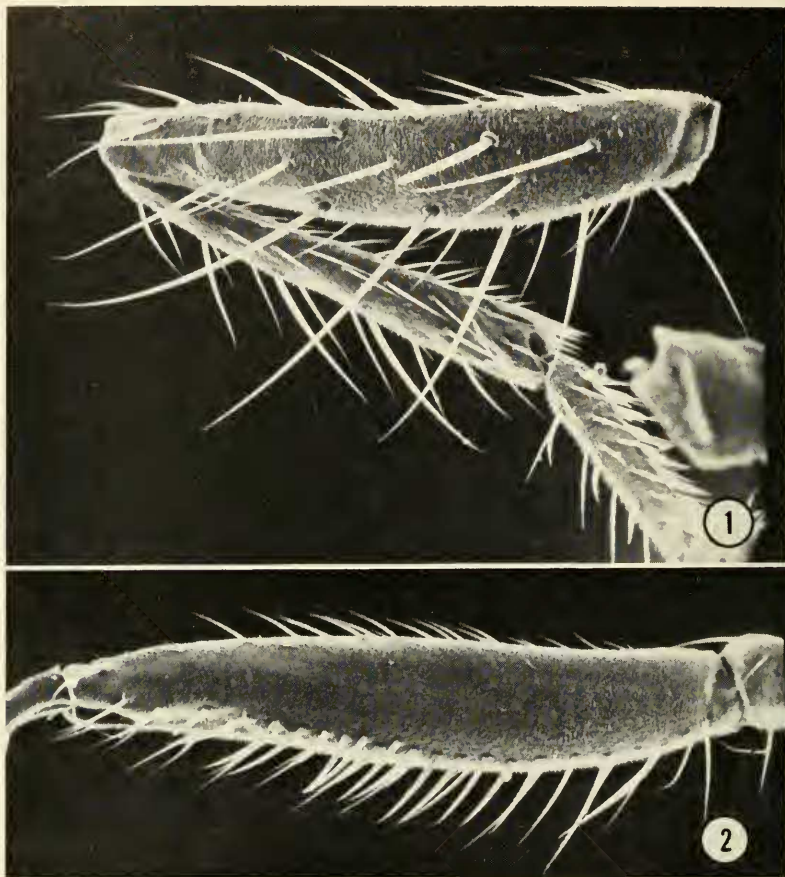
Figs. 1-5

Diagnosis.—Specimens of this species closely resemble those of *P. aicen* and *P. lebam* but are distinguished by the following combination of characters: Middle dorsally-curved genal seta subequal in length to setae on either side; spinelike setae along costal margin larger, those between humeral crossvein and subcostal break longer than width of 1st costal cell; body more setose; surstylus of male terminalia long and slender, digitiform, ventral margin rounded in lateral view, pointed medially in caudal view.

Description.—As in generic description but with the following additional details. Length 1.68 to 2.57 mm.

Head: Mesofrons yellowish gold to faintly lavender, appearing semi-lustrous from some angles; parafrons yellowish gold to rusty orange; middle dorsally-curved genal bristle subequal in length to setae on either side.

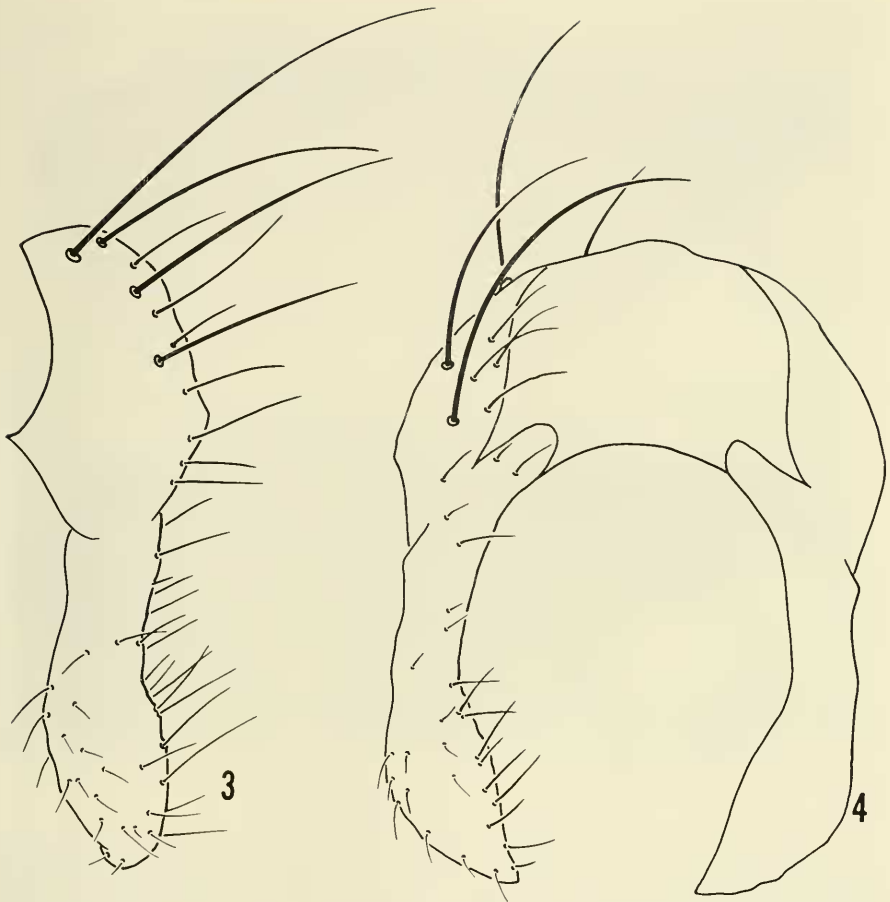
Thorax: Mesonotum charcoal gray. Front femur with 3-4 long setae



Figs. 1-2. *Canace hoguei*. 1, Left front leg, posterior view. 2, Femur of middle leg, posterior view.

along posteroventral margin, length more than $2\times$ greatest width of femur (Fig. 1), front femur also with 5-7 slender pale setae along proximal $\frac{1}{2}$ of ventral surface; middle femur of male with row of closely set setae along posteroventral margin extending to base, setae on proximal $\frac{1}{4}$ or less pale (Fig. 2); middle and hind basitarsi yellowish brown to grayish brown, front basitarsus paler than tibia but not distinctly yellowish. Wing length averaging 1.91 mm; setae along costal margin spinelike, those between humeral crossvein and subcostal break longer than width of 1st costal cell (Fig. 5).

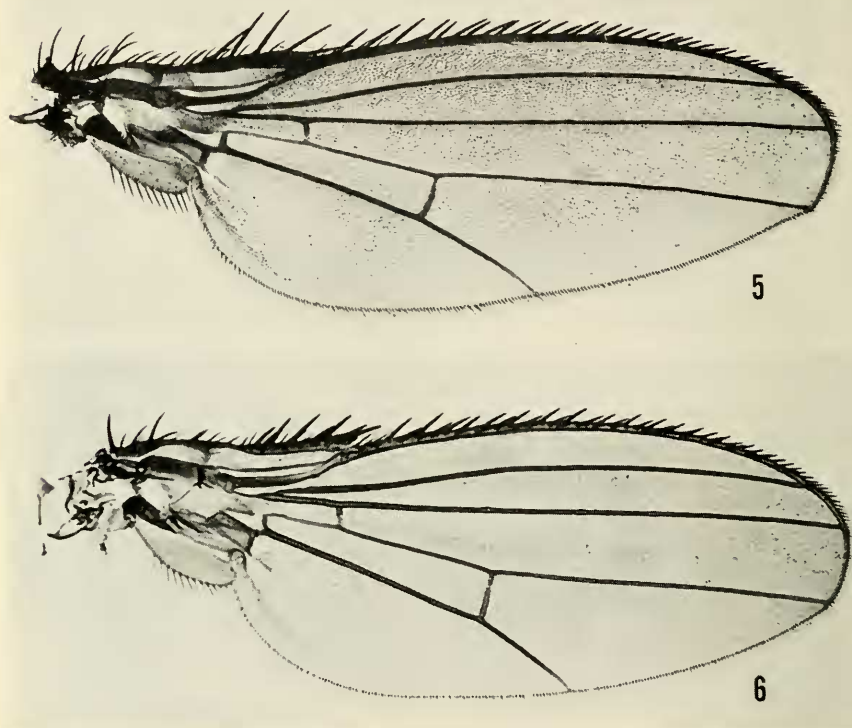
Abdomen: Surstylus of male terminalia (Figs. 3-4) long and slender, slightly angulate in lateral view; ventral margin rounded in lateral view;



Figs. 3-4. *Canace hogueti*. 3, Epandrium and surstylus, lateral view. 4, Same, caudal view.

ventromedial angle pointed in caudal view; posterior margin lacking an isolated row of distinctive setae.

Types.—Holotype ♂, labelled: "COCOS ISLAND (Costa Rica) Wafer Bay 17-22 Apr. '75 C. L. Hogue." Allotype ♀ and 170 paratypes (34 ♂, 136 ♀) with same label data as the holotype. The holotype, allotype, and most of the paratypes will be deposited in the Los Angeles County Museum of Natural History. Paratypes will also be deposited in the National Museum of Natural History, Washington, D.C., the British Museum (Natural History), London, and the California Academy of Sciences, San Francisco.



Figs. 5-6. Wing. 5, *Canace hoguei*. 6, *Canace aicen*.

Geographic distribution.—This species is known only from the type-locality, Isla del Coco (Cocos Island). This island is situated approximately 550 km from the Costa Rican coast in the Pacific Ocean 5°33' north latitude; 87° west longitude).

Etymology.—The species epithet *hoguei* is a genitive patronym honoring the distinguished entomologist Dr. C. L. Hogue, collector of the type-series.

Paracanace lebam Mathis and Wirth, new species

Figs. 7-9

Diagnosis.—Specimens of *P. lebam* are similar and closely related to those of *P. aicen* and *P. hoguei* but are distinguished by the following combination of characters: Middle dorsally-curved genal seta about $\frac{1}{2}$ length of setae on either side; spinelike setae along costal margin, particularly those between humeral crossvein and subcostal break, about as long as width of 1st costal cell; general appearance setose, like specimens of *P.*

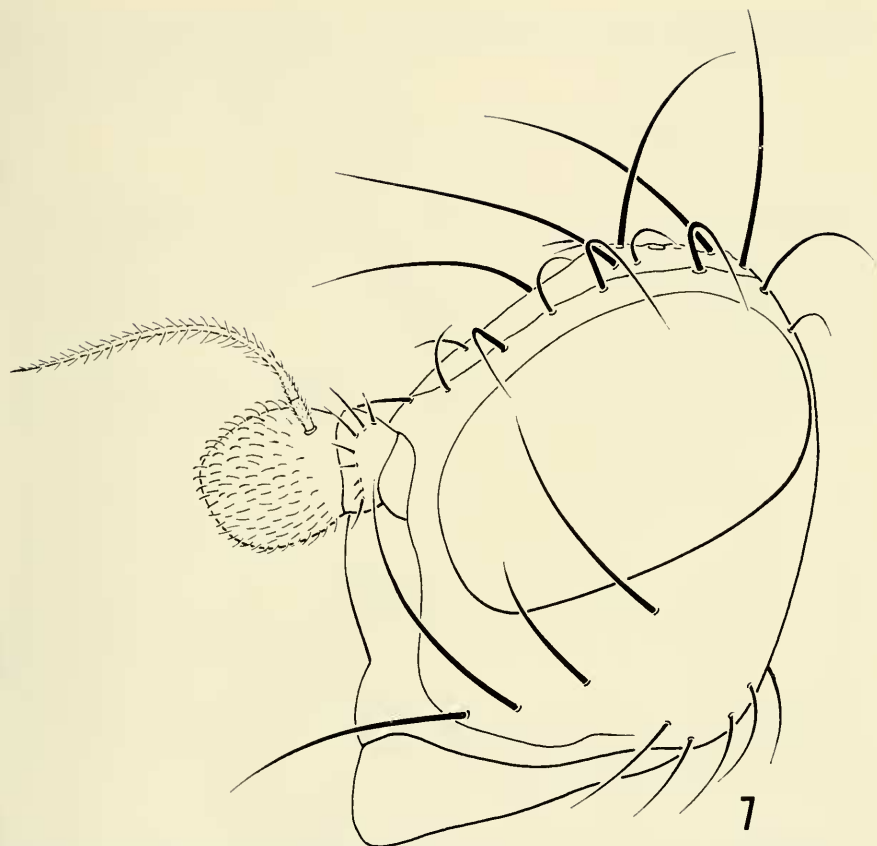


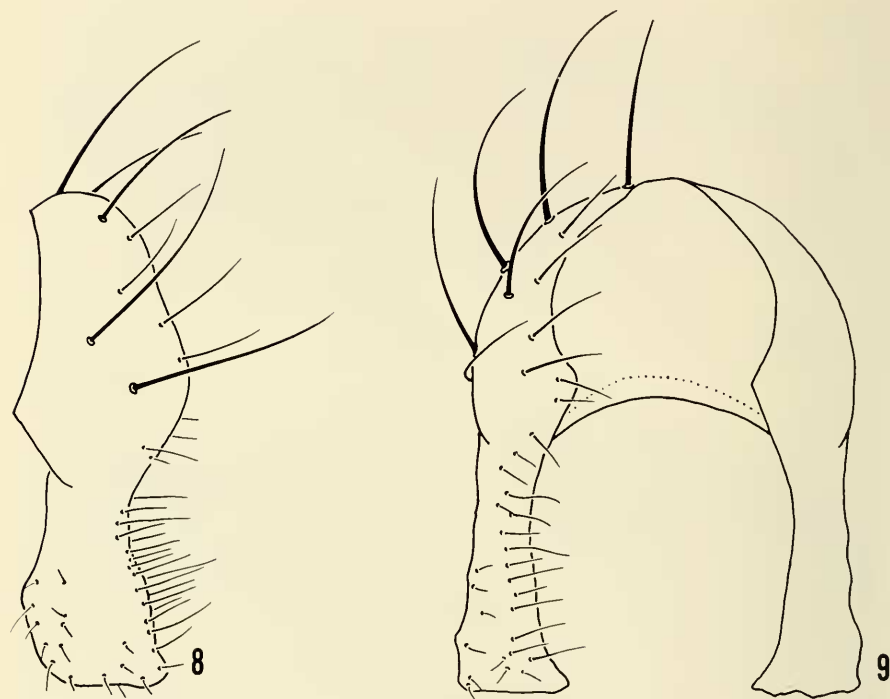
Fig. 7. *Canace lebam*, head, lateral view.

aicen; surstylus of male terminalia about $1\frac{1}{2}\times$ as long as wide in lateral view, broadly truncate along ventral margin in lateral and caudal views; ventromedial angle pointed in caudal view; posterior margin with distinctive row of longer setae.

Description.—As in generic description but with the following additional details. Length 1.76 to 1.94 mm.

Head (Fig. 7): Mesofrons dark, grayish brown to black, dull, only slightly darker than general coloration of mesonotum; parafrons grayish olivaceous to brownish green, contrasting distinctly with darker mesofrons; middle dorsally-curved genal seta about $\frac{1}{2}$ length of setae on either side.

Thorax: Mesonotum grayish brown to charcoal gray. Front femur with 3–4 long setae along posteroventral margin, length more than $2\times$ greatest width of femur, front femur also with 2–3 slender pale setae along proximal



Figs. 8-9. *Canace lebam*. 8, Epiandrium and surstylus, lateral view. 9, Same, caudal view.

$\frac{1}{3}$ of ventral surface; middle femur of male with row of closely set setae along posteroventral margin extending nearly to base, setae on proximal $\frac{1}{4}$ or less pale; basitarsi of all legs nearly concolorous, grayish brown, only slightly paler than tibia. Wing length averaging 1.65 mm; setae along costal margin spinelike, those between humeral crossvein and subcostal break equal in length to width of 1st costal cell.

Abdomen: Surstylus of male terminalia (Figs. 8-9) about $1\frac{1}{2}\times$ as long as broad, in lateral view; ventral margin broadly truncate in lateral and caudal views; ventromedial angle of surstylus in caudal view somewhat pointed; posterior margin with distinctive row of setae.

Types.—Holotype δ , labelled: "JAMAICA Runaway Bay Feb. 1969 W. W. Wirth bay shore." Allotype f and 1 δ paratype with same label data as the holotype. The type-series is in the National Museum of Natural History, Washington, D.C., type number 75303.

Geographic distribution.—Specimens of *P. lebam* have been collected only at the type-locality, Runaway Bay, Jamaica.

Etymology.—The species epithet *lebam* is an anagram of the proper name Mabel (Wirth), after whom this species is named. The epithet is a noun in apposition to the generic name.

Paracanace aicen Mathis and Wirth, new species

Figs. 6, 10–11

Diagnosis.—*Paracanace aicen* is closely related and similar to *P. lebam* and *P. hoguei* but is distinguished from either of the latter by the following combination of characters: Middle dorsally-curved genal seta about $\frac{1}{2}$ length of setae on either side; spinelike setae along costal margin about as long as width of 1st costal cell; general appearance setose but less so than in *P. hoguei*; surstylus of male terminalia with anterior swelling near middle in lateral view and broadly rounded ventrally; in caudal view with developed ventromedial angle but not pointed; posterior margin of surstylus not notably setose.

Description.—As in generic description but with the following additional details. Length 1.72–2.24 mm.

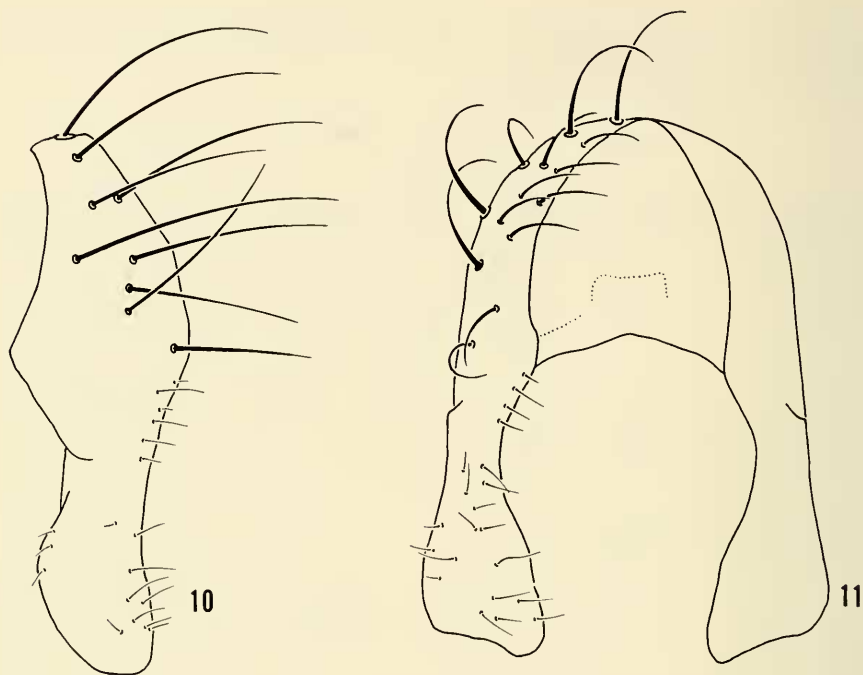
Head: Mesofrons dark, grayish brown to black, dull, nearly concolorous with mesonotum; parafrons yellowish to olivaceous brown, contrasting distinctly with darker mesofrons; middle dorsally-curved genal seta about $\frac{1}{2}$ length of setae on either side.

Thorax: Mesonotum dark grayish brown. Front femur with 3–4 long setae along posteroventral margin, length more than $2\times$ greatest width of femur, front femur also with 5–7 slender pale setae along proximal $\frac{1}{2}$ of ventral surface; middle femur of male with row of closely set setae along posteroventral margin extending nearly to base, setae on proximal $\frac{1}{4}$ or less pale; basitarsi of all legs nearly concolorous with tibiae. Wing length averaging 1.76 mm; setae along costal margin spinelike, those between humeral crossvein and subcostal break equal in length to width of 1st costal cell (Fig. 6).

Abdomen: Surstylus of male terminalia (Figs. 10–11) about $2\times$ as long as broad; anterior margin swollen near middle in lateral view; ventral margin broadly rounded in lateral view; ventromedial angle of surstylus produced but not pointed in caudal view; posterior margin lacking obvious row of setae.

Types.—Holotype ♂, labelled: "DOMINICA, W. I. Calibishie 27 Feb. 1965 W. W. Wirth sea shore/Bredin-Archbold Smithsonian Bio. Surv. Dominica." Allotype ♀ and 3 paratypes (1♂, 2♀) with same label data as the holotype. The type-series is in the National Museum of Natural History, Washington, D.C., type number 75304.

Geographic distribution.—Specimens of *P. aicen* have been collected only from the type-locality, Calibishie, Dominica.



Figs. 10-11. *Canace aicen*. 10, Epandrium and surstylus, lateral view. 11, Same, caudal view.

Natural history.—Wirth collected the type-series on an algae covered, intertidal rock shelf on the beach to the west of the village.

Etymology.—The species epithet *aicen* is an anagram of the proper name Necia (Dianne Mathis), after whom this species is named. The epithet is a noun in apposition to the generic name.

General Discussion

Paracanace belongs to a group of related taxa of the family Canacidae that is recognized as follows: Body coloration generally gray; head in lateral aspect narrow, higher than wide; 3 pairs of larger eclinate fronto-orbital setae; frons short; eye as high as wide, suboval to subrectangular, and oriented at an oblique to nearly vertical angle to general plane of head; 1 distinct, ventrally-curved lower mesopleural seta. Although the relationships among the included taxa of this assemblage have not been adequately clarified, several taxa can be grouped into closely related, monophyletic groups as evidenced by apotypic character states. Among these taxa are the genera *Canaceoides* Cresson (Wirth, 1969) and *Paracanace*. We believe

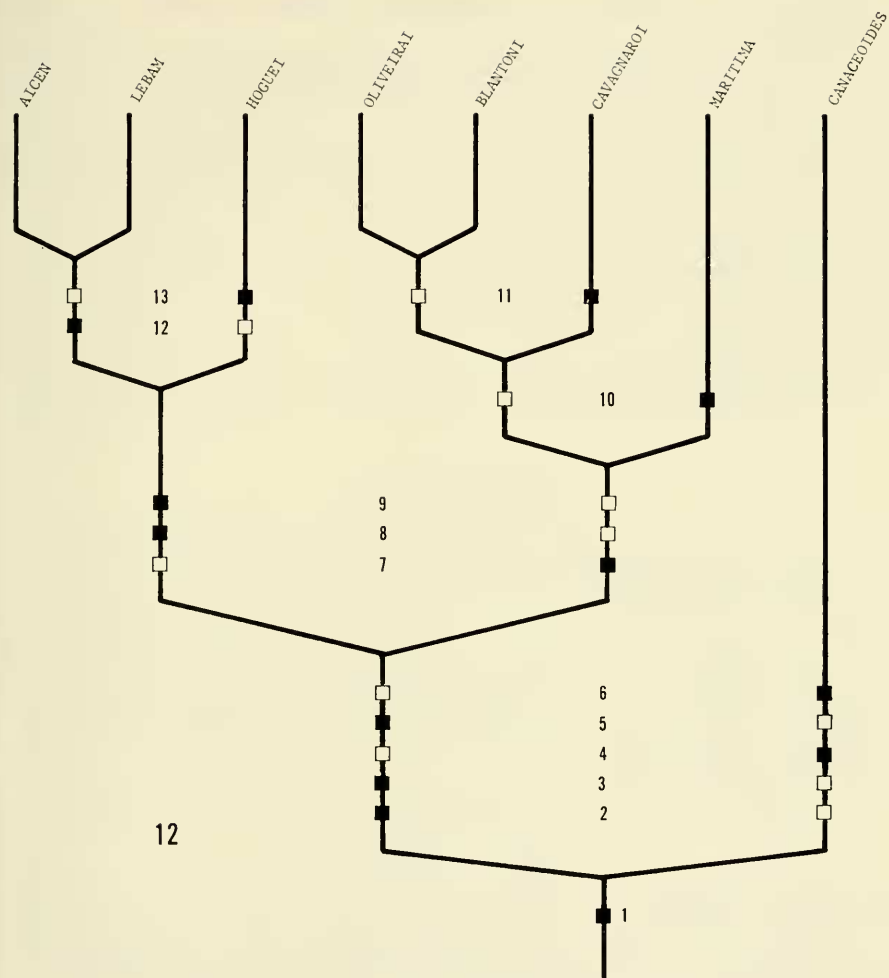


Fig. 12. Argumentation scheme for the hypothetical phylogeny of the genus *Paracanace*. Filled squares indicate apotypic character states; open squares indicate plesiotypic character states.

that these two genera are sister-groups. This relationship is corroborated by the reduced anterior notopleural seta, a character state we interpret to be apotypic.

We suggest that the phylogeny of the species of *Paracanace* is as diagrammed in Fig. 12. Numbers in the cladogram correspond with characters listed in Table 1. The relative plesiotypic-apotypic states were determined primarily from out-group comparisons.

Table 1. Characters and character states used in cladistic analysis of the species of *Paracanace*.

CHARACTER	CHARACTER STATE	
	Apotypic	Plesiotypic
1. Anterior notopleural seta	reduced, less than $\frac{1}{2}$ length of posterior seta	subequal to posterior seta
2. Disc of scutellum	bare	with seta
3. Number of large interfrontal setae	2 pairs	1 pair
4. Setae on 8th tergum of female	setae subequal	with 1 or 2 pairs of larger setae
5. Setae along posteroventral margin of middle femur of male	partial to complete row of closely set setae	lacking row of closely set setae
6. Shape of female atrium	U-shaped, incomplete posterior end	oval
7. 3-4 long slender black setae along posteroventral margin of front femur	absent	present
8. Setae along costal margin of wing	large, spinelike	normally developed
9. Row of setae along posteroventral margin of middle femur of male	extending along entire length	evident only along distal half
10. Male terminalia, shape of surstylus	complicated with subbasal constriction and anterior subbasal setose lobe	simple, fingerlike
11. Color of basitarsus	dark	pale
12. Length of middle dorsally-curved genal seta	short, about $\frac{1}{2}$ length of setae on either side	long, subequal to length of setae on either side
13. Coloration of mesofrons	semilustrous, faintly lavender	dull, dark greenish to grayish brown or black

The monophyly of *Paracanace* is clearly evident, being confirmed by three apotypic character states as noted in the diagnosis and Table 1. We suggest that the genus differentiated into two lineages. The first lineage includes the three new species described above. These three species are closely related as evidenced by the large spinelike setae along the costal wing margin and the nearly complete row of closely set setae along the posteroventral margin of the middle femur. The two West Indian species, *P. aicen* and *P. lebam*, of this lineage are distinguished from *P. hoguei* by

the short middle dorsally-curved genal seta and the dull coloration of the mesofrons.

The second lineage of the genus comprises the remaining four species, *P. blantoni*, *P. cavagnaroi*, *P. maritima* and *P. oliveirai*. These species are characterized by the loss of the three or four long slender black setae along the posteroventral margin of the front femur. Of this group, *P. maritima* is characterized by the unique conformation of the male terminalia and the 20 or so long white hairs on the front femur. This distinctive species probably arose from a lineage apart from the other three species as indicated on the cladogram. The remaining three species are all quite similar in general appearance; and, except for specimens of *P. cavagnaroi*, reference to structures of the male terminalia will usually be necessary to accurately identify them. Unlike the other two species, the tarsi of specimens of *P. cavagnaroi* are dark.

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